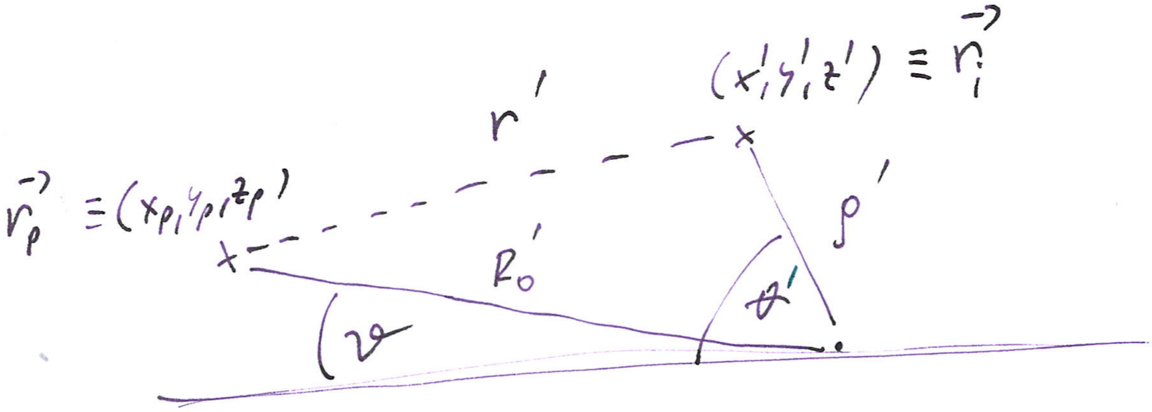
difr. integrál – sférické souř.

L2



$$a(x', y', z') \approx \frac{e^{ikR_0'}}{R_0'} \iint_S P(x_p, y_p, z_p)\, e^{-ikr'}\, dS$$

po sférické vlně

$$(x_p, y_p, z_p) \to (R_0', \vartheta, \varphi_p)$$

$$(x', y', z') \to (\rho', \theta', \varphi')$$

na sféře $P(x_p, y_p, z_p) \to P(\vartheta, \varphi_p)$

$$r' = \sqrt{(x'-x_p)^2 + (y'-y_p)^2 + (z'-z_p)^2}$$

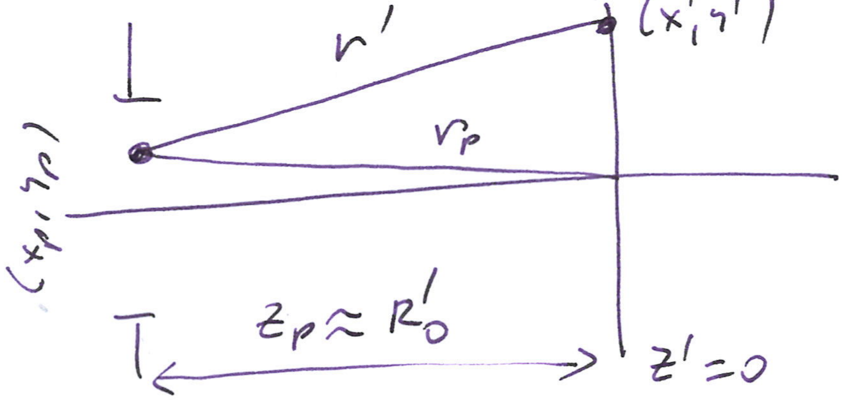
$$= \sqrt{\rho'^2 + R_0'^2 - 2\,\vec{r}_p \cdot \vec{r}_i}$$

$$\cong R_0' \left(1 - \frac{\vec{r}_p \cdot \vec{r}_i}{R_0'^2}\right) = R_0' - \frac{\vec{r}_p \cdot \vec{r}_i}{R_0'}$$

$$e^{-ikR_0'}$$

např. $\frac{x' x_p}{R_0'} = \rho' \sin\vartheta \times \sin\theta' \cos\varphi_p \cos\varphi'$

pravoúhlé souřadnice



$$a(x', y') \approx \iint_S e^{ikr_p}\, e^{-ikr'}\, P(x_p, y_p)\, dx_p\, dy_p$$

$$e^{ikr_p} = e^{ik\sqrt{x_p^2 + y_p^2 + R_0'^2}} \approx e^{ikR_0'}\, e^{ik\frac{x_p^2 + y_p^2}{2R_0'}}$$

$$e^{-ikr'} = e^{-ik\sqrt{(x_p - x')^2 + (y_p - y')^2 + R_0'^2}}$$

$$\approx e^{-ikR_0'}\, e^{-ik\frac{(x_p - x')^2 + (y_p - y')^2}{2R_0'}}$$

$$e^{ikr_p} e^{-ikr'} = \underbrace{e^{-ik\frac{x'^2 + y'^2}{2R_0'}}}_{\text{kvadr. fáze obr.}}\, e^{\overbrace{i\frac{k}{R_0'}(x' x_p + y' y_p)}^{}} \ .$$

FT